

Please read this manual carefully before installing, commissioning or operating the plate evaporator PVS and PVSE.



### 1. INTENDED USE

The plate evaporator (respective liquid cooler), with built on high-effective surge drum, type PVS and PVSE is solely designed be used in flooded refrigeration systems.

### 2. SAFETY REQUIREMENTS

Any work with refrigeration systems must be carried out by trained personal. All safety regulations and codes of practice concerning prevention of accidents or the safe use of refrigerants must be adhered to.

Under no circumstances are the indicated temperature- and pressure limitations on the data plate to be exceeded!



An safety valve or overflow valve must be installed to prevent unacceptable pressure increase.



The refrigerant charge of the system must only be changed by trained personnel, familiar with the refrigeration system. The maximum charge of the vessel, as indicated on the drawings and the data plate, must not be exceeded!

Fire prevention should be considered to avoid unacceptable overheating of the plate evaporator.



To avoid freezing of the evaporator appropriate means have to be considered, e.g. Control of the evaporating temperature respective evaporating pressure.

Before commissioning make sure all safety equipment has been checked and works properly. Any safety equipment must be retested after disassembly or activation.

All information for the safe operation and maintenance of this oil drain vessels is based on our experience and is to the best of our knowledge.

### 3. 3. TERMS OF WARRANTY

To prevent accidents and for the safe operation of the refrigerant plant no modifications or alterations may be carried out to the oil drain vessel without written approval by TH. WITT Kältemaschinenfabrik GmbH.

All information for the safe operation and maintenance of this oil drain vessels is based on our experience and is to the best of our knowledge.

**Our liability or warranty is excluded, if:**

- The instructions in this manual are not adhered to
- The plate evaporator and its equipment was operated incorrectly or the handling was not in accordance with the mentioned procedures
- The plate evaporator is used for purposes other than that for which it was intended to
- Safety devices were not used or disconnected
- There have been modifications made without written approval
- During installation or operation the safety requirements were not adhered to



# Manual

## Plate Evaporators PVS and PVSE

Date: 12/2010

W 3542-6.01E c

Blatt 2 / 4

MW

#### 4. SCOPE OF DELIVERY

The scope of delivery is specified in the order confirmation and technical drawings that belong to the order. This includes for example:

##### Secondary refrigerant side:

- 1 Thermostat (optional)

##### Refrigerant side:

- 1 standpipe with Min.-Max.-marks
- 1 oil drain sump with oil drain valve
- 1 oil-drain quick acting valve (optional)
- WITT maximum level switch NGX (optional)
- WITT oil return BDP (optional)

#### 5. DESCRIPTION OF OPERATION

The plate evaporator consists of a visible refrigerant vessel that contains a round, fully welded, stainless steel plate stack made by Vahterus, Finland.

The plates are welded in pairs. At one side the cooling liquid (secondary refrigerant) will flow through whereas refrigerant evaporates at the other side of the plates.

The built up surge drum is connected with generously sized down legs to the plate evaporator underneath.

The secondary refrigerant is fed through the connections in the front plate. Larger volume flows may require 2 parallel connections for inlet and outlet.

The liquid level of the refrigerant is indicated by ice-, respective condensate formation at the standpipe of the surge drum. During operation the level should never fall below the minimum mark. During stand still the maximum mark should not be exceeded.

To protect the compressor against liquid carry over an automatic WITT maximum level switch NGX, can be ordered optional.

To control the temperature of the secondary refrigerant you may choose between several options. It has been proven good practice to use a thermostat on the secondary refrigerant side to control the compressor capacity. If this is not possible you should control an automatic valve between surge drum and compressor.



It is not recommended to control the secondary refrigerant flow through the plate evaporator, since this may result in an unstable condition of the heat transfer.

Compared to other evaporator types the fully welded plate evaporator will not be destroyed that fast if the freezing protection fails. Due to the compact design defrosting can be very time consuming. Therefore a longer interruption of your operation should be considered in this case.

**We would like to state explicitly at this point that we do not accept a warranty for any units that were destroyed by freezing!**

When plate evaporators are arranged in parallel the pressure drop of each unit should be about the same.

#### 6. SHIPPING AND STORAGE

All openings (connections, etc.) are covered with yellow protection caps to prevent the intake of moisture or dirt. Storage shall be dry and protected from any dirt or debris.

If storage is required for more than two months or shipping overseas, the vessel shall be filled with an inert gas charge to prevent corrosion.



Use only the intended mounting brackets to lift up the pressure vessel.



# Manual

## Plate Evaporators PVS and PVSE

Date: 12/2010

W 3542-6.01E c

Blatt 3 / 4

MW

### 7. INSTALLATION

The plate evaporator is designed (statically calculated) for indoor installation, only

Allow sufficient space for inspection and servicing.

The frame should be placed on an even ground. The entire unit should be aligned horizontally.

Remove all plastic caps or other sealings immediately prior to (and not before) installation of the heat exchanger.



Make sure all interconnecting pipework is stress free when installation the unit. Do not allow vibrations to stress any connections.



To avoid any air may collect inside the plate heat exchanger, the top connection should be used as secondary refrigerant outlet. The connecting piping system should be designed accordingly, to avoid any gas collection as well.

### 8. COMMISSIONING

Commissioning and start up of the HDB oil drain vessel is not permitted until a safety analysis of the entire refrigeration installation has been carried out.

On completing installation of the oil drain vessel, the refrigerant plant must be pressure tested and documentation relating to the testing kept in a safe place.

Make sure the system is sufficient dry. A vacuum test at below 270 Pa for at least 30 minutes should pass successfully. Thereupon you should break the vacuum with nitrogen. The next vacuum test of the system should hold the pressure below 270 Pa for at least 6 hours.

#### Please make sure that

- All piping has been connected according to the drawings
- The required safety devices are installed and tested
- The concentration of the secondary refrigerant has been set properly

#### Liquid Charge

The secondary refrigerant should be filled first and degassed adequately.

The refrigerant charge as mentioned on drawings and data plate should only be filled by knowledgeable personnel trained in the safe use of refrigerants and familiar with applicable regulations and codes of practice. The person in charge should be aware of the maximum charge of the entire refrigeration system to avoid overfilling.

Upon filling of the system the pressure should be increased slowly to the operating pressure. During this time the secondary refrigerant side should degassed carefully.

### 9. OPERATION

Upon start-up you should attend the system until the operation has come to a stable condition. Then you can put the unit into permanent operation.

#### Important:



Even with fully welded plate stacks there remains the possibility that a leak may occur. Particularly with ammonia the operator should check the secondary refrigerant within the first weeks of operation. Later a periodical check (e.g. once a year) is sufficient.



# Manual

## Plate Evaporators PVS and PVSE

Date: 12/2010

W 3542-6.01E c

Blatt 4 / 4

MW

### 10. SERVICING AND INSPECTION



A visual inspection of the plate evaporator, including the surge drum, shall be carried out at regular intervals, e.g. according to EN 378-2 or other appropriate regulations. (This includes visual testing with regard to corrosion)



An oil layer on the plate surfaces will cause a dramatic decrease of the heat transfer. When using ammonia as refrigerant it is recommended to drain the oil frequently, if no automatic oil return has been installed.



Any contamination must be avoided, because this could block the narrow channels within the plate stack.

There are two options to clean the unit, if the secondary refrigerant side becomes contaminated:

- Back flush with secondary refrigerant at high
- Cleaning with chemicals

Please contact us prior to cleaning the apparatus to receive further information regarding this subject.



Never use hydrochloric acid to clean the stainless steel plates, not even in low concentration!!

### 11. TROUBLE SHOOTING WHEN THE HEAT TRANSFER IS REDUCED

#### 1. To be checked at the secondary refrigerant side:

Is the flow reduced or blocked?

⇒ If not check the refrigerant side.

#### 1.1 Is the freezing protection in use and functioning properly?

⇒ If not defrost the apparatus

#### 1.2 Is the freezing point of the secondary refrigerant higher than the set point of the freezing protection?

⇒ Defrost the apparatus.

#### 1.3 Is the apparatus contaminated?

⇒ Search for the cause and eliminate it. Clean the secondary refrigerant side.

#### 1.4 Is it possible that air has collected inside the heat exchanger? (This is possible if the unit is operated in part load or with a bad-piping system.)

⇒ Increase the velocity of the secondary refrigerant flow to flush out any gas bubbles.

#### 2. To be checked at the refrigerant side

#### 2.1 Proper functioning of automatic and adjustable valves.

⇒ Make sure the required refrigerant flow is provided

#### 2.2 Is it possible that oil contaminates the plate surfaces?

⇒ Drain the oil carefully considering regulation and codes of practice.